# Don’t Overlook the Post and Core Procedure

## A new system from 3M Company simplifies tried-and-true technique for minimally invasive dentistry

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We hear it often: a dentist’s responsibility and ultimate goal is to provide each patient with the best possible treatment based on their individual needs. For patients, that often means helping to ensure they’ll be able to eat and smile without worry. Every patient is different, and with each issue presented, there are often a multitude of ways you can approach treatment. For example, let’s say your patient presents with a previously endodontically treated tooth that has fractured, without enough structure to effectively support a crown in the long run. If you don’t have sufficient surface area (length, width, height) for a crown, the physical nature of chewing and functional use will loosen that crown and break down the cement, and consequently the patient will need to return frequently to have the restoration re-cemented. This type of chronic issue can create a long-term, stressful environment for both the patient and the dentist—both an uphill and losing battle.

When a crown is not a viable treatment plan, you have several options—you may remove the tooth and place an implant, you might consider a bridge, or you can turn to the post and core technique to retain the original tooth structure. By preserving the tooth, you can avoid bone loss, receding gum tissue and prevent destruction of adjacent tooth structure that bridge treatment may cause. Choosing the post, core and crown procedure means you can maintain the natural function of the tooth, and quickly rehabilitate the condition while preserving the stability and function of the root complex.

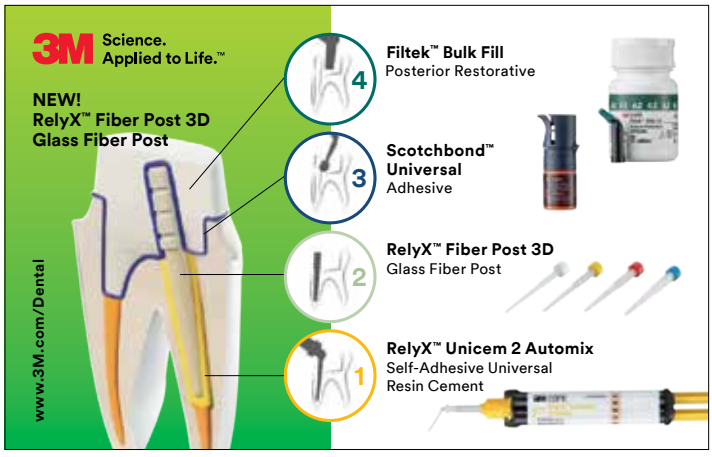
With more and more dentists adopting a minimally invasive approach to treatment, techniques that allow the patient to retain as much of their original dental structure as possible are becoming increasingly valuable. Financially, physically and from a long-term care standpoint, the post, core and crown technique offers an important option for effective patient care, but may be overlooked or thought to be time-consuming and inefficient, adding steps to an already complicated endodontic procedure. With new systems entering the marketplace, it’s vital that we make time to review available materials to identify the most effective post and core techniques.

**Finding the Right Materials**

I’ve been utilizing the post and core procedure for many years with great success. The key has been finding a material that, structurally, is designed to ensure the long-term success of the compromised tooth. There are many posts on the market that utilize titanium, zirconium or gold, that have in my experience lacked the shock-absorbency or flexural properties needed to negate the potential for fracturing.

Lately, I’ve been working with a newly introduced fiber post, RelyX™ Fiber Post 3D Glass Fiber Post from 3M, which utilizes a post made of a glass fiber material imbedded in resin. The post has a tapered structure to match the nerve chamber and canal itself, following the same geometry. As the post extends out of the root and above the gum line, you will notice what I call knurled architecture—a geometry that’s different than the lower, smooth portion. The extension above the gum line where these coronal 3D macro retentions have been placed allows integration (chemical and mechanical) between the adhesive, 3M™ Scotchbond™ Universal Adhesive, and the core material, 3M™ Filtek™ Bulk Fill Posterior.

Along with the physical interlocking of the adhesive and core material, the post’s microporous surface bonds mechanically with the cement, while the cement also bonds to the dentin in the walls of the canal. The post’s radiopacity assists with position control within the canal.



**Case Study**

A 58-year-old female patient presented with a post-endodontic procedure on tooth number 20 with approximately 10-15 percent of the original tooth structure intact as compared to the adjacent premolar (**Fig. 1**). My first criteria after looking at the radiograph is to determine the approximate post width and length, as well as an approximate shade for the core material. In this instance I chose to work with Filtek™ Bulk Fill Posterior Restorative material from 3M, which offers several shades to coordinate with the shade of the final crown.

It's important to select a core material or foundation material that has the density and tenacity for you to prepare like you would a natural tooth, and the coloration that allows you to place an all-ceramic crown that's more translucent and lifelike. These crowns reflect to some degree the internal structure on which they are placed, so the goal is to select a core material or base material that has some internal coloration.

Once the post width and length has been determined, the appropriate reamer drill is selected from the kit and is used to size the post base (**Fig. 2**), followed by try-in of the RelyX Fiber Post 3D (**Fig. 3**). The system has five drills and four post sizes available, each with corresponding diameters to enlarge the canal to the width of the post. The drill is brought down into the canal, irrigated, rinsed, dried and repeated to ensure adequate final length.

In this process, the goal is to remove as little of the remaining internal structure as possible, and to ensure there is enough width so the post fits intimately, but doesn't bind when placed into the canal. The interface of the cement with the post should create the final bond—not the friction of the post within the canal.

After the post has been tried in and the correct length and width are confirmed, the colored rubber stopper (coinciding with the various post widths) allows a marker for trimming the post. The post is trimmed using a very thin diamond disc and a lab hand piece. (**Fig. 4**). The post should be trimmed at a right angle to avoid fraying or exposing any unwanted fibers. The final length of the post is determined by the length of the patient's canal and the tooth being restored. Ideal length extends to about 2/3 of the root, with about 5mm of remaining gutta percha to act as an apical seal. Width is determined by canal size as well, with wider, longer teeth generally having wider canals. Nerves have a tendency to calcify over time, and so older patients may have narrower canals.

The tooth is isolated, and the post is covered with 3M™ RelyX™ Unicem 2 Self-Adhesive Resin Cement. Because the cement is light-activated, the post should remain shielded from any bright light until it is placed into the canal. As the assistant holds the post, the apical portion is first covered with the cement and shielded from light. Just following, the cement is also injected into the root using an endotip on the syringe, extending all the way into the deepest portion of the prepared root (**Fig. 5**).

Once the tip is extended completely, the material is extruded

Figure 1. Pre-op, post endodontic treatment for tooth no. 20.

Figure 3. Try-in of 3M™ RelyX™ Fiber Post 3D.

Figure 2. Reamer drill is utilized to size canal.

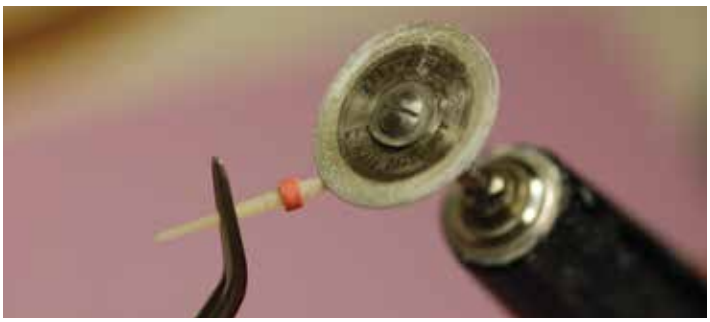


Figure 4. Post is trimmed with a thin diamond disc.

gradually while moving the tip upwards to ensure no air bubbles or voids occur. The fiber post is then inserted into the canal before being light cured utilizing the 3M™ Elipar™ DeepCure-S LED curing light for about 40 seconds to stabilize. Due to the glass and resin composition of the fiber post, light can carry down into the tip of the root, resulting in a more complete cure of the cement. We recommend rotating the post slightly during insertion to avoid the inclusion of air bubbles. Remove the excess cement with a suitable instrument or a cotton pellet.

After light curing the cement, a phosphoric etch is placed on all residual tooth structure around the post. It is then rinsed, dried and Scotchbond™ Universal Adhesive is applied to the post and all adjacent remaining tooth structure, scrubbing the adhesive for 20 seconds, air drying for 5 seconds, and then light curing for 10 seconds (**Fig. 6**).

Next, my team utilizes a preoperative model created before undertaking the buildup procedure. This allows us to create a model and a polypropylene stent to act as a fabrication guide. The stent acts as a mold to allow the creation of an anatomical form similar to the original tooth with the bulk fill material. Using a dispensing gun, the Filtek™ Bulk Fill Posterior Restorative material is extruded into the thermoplastic mold, filling the form completely **(Fig. 7)**. A composite instrument is used to compress the material and ensure there are no voids. You want a dense buildup and to fill the stent up completely with the material (**Fig. 8**). The material remains in a malleable state until it is light cured, offering adequate working time to manipulate if needed once in the mouth.

A small amount of bulk fill material is extruded onto the post, and a composite instrument is used to compress the material into the coronal grooves to engage the undercuts **(Fig. 9)**. This particular step ensures that the mechanical interlock between the post and the buildup is achieved. The thermoplastic stent is now placed over the post and fits into the adjacent teeth, allowing the buildup to interlock and stabilize on the post. The buildup is light cured for 10 seconds each on the buccal, occlusal and lingual sides. The stent can remain in place during the light curing portion of the procedure, with the tip of the curing light resting directly on the stent at right angles **(Fig. 10)**.

The stent is removed, and we are now left with a hardened foundation, which is color coordinated to the shade desired for the final crown (**Fig. 11**). The buildup is anatomically correct, and close in size and shape to the original tooth. The buildup is now prepared using a diamond burr, prepared just as an actual tooth would be, respecting the same preparation dimensions required by the crown material (**Fig. 12**). The preparation is completed and the gingiva is retracted (**Fig. 13**). 3M™ Imprint™ 4 Penta™ Super Quick Impression Material (heavy body and light body) is dispensed, and an impression of the preparation is taken (**Fig. 14**). The patient returns for seating of the final all-ceramic crown, which is etched with hydrofluoric acid, silane treated and cemented with RelyX Unicem 2 Self-Adhesive Resin Cement and light cured according to material specifications (**Fig. 15**). The new crown is a significant change for the patient in both aesthetics and function, enabling regular chewing and eating.

Figure 5. 3M™ RelyX™ Unicem Self-Adhesive Resin Cement is injected into the canal.

Figure 6. 3M™ Scotchbond™ Universal Adhesive is applied to post and tooth, cured with 3M™ Elipar™ DeepCure-S LED curing light.

Figure 7. Vacuum-formed stent is filled with 3M™ Filtek™ Bulk Fill Posterior Restorative Material in shade A3.

Figure 8. Stent is completely filled with restorative material.

## Conclusion

The streamlined post and core procedure detailed in this case has meant increased efficiency and simplicity in my practice. The materials science in these compatible products results in four components (post, cement, adhesive and bulk fill material) coming together to act as one structure. This offers the capability to maintain the tooth long term, both because of the physical nature of the interlocking materials, and because of the post material's ability to distribute forces throughout the root to avoid undue forces and fracturing.

The post and core procedure will continue to be a mainstay in my practice because it offers a reliable and effective technique to help maintain patients' original tooth structure, and ultimately helps to provide them the best outcomes possible.

Figure 9. 3M™ Filtek™ Bulk Fill Posterior Restorative is compacted onto Rely Fiber Post 3D.

Figure 10. Placement of the filled stent, light cure.

Figure 11. Completed and light cured bulk fill core.

Figure 12. Preparation of core for crown placement.

Figure 13. Completed preparation of tooth no. 20.

Figure 14. Final impression with 3M™ Imprint™ 4 VPS Impression Material.

Figure 15. Final all-ceramic crown cemented with 3M™ RelyX™ Unicem 2 Cement and light cured.

Dr. Braun pursued the D.D.S. program at the University of Michigan and after graduation he earned a Masters degree in Prosthodontics from the same institution. Upon returning to his hometown of Saginaw Michigan, he established a full-time private practice specializing in Prosthodontics, in operation for over 25 years. Staff appointments have included the University of Michigan School of Dentistry and hospitals in Ann Arbor and Saginaw, Michigan.

For over 10 years, Dr. Braun has offered seminars at a great number of national and international meetings. Presentations have been made to over twenty A.D.A. affiliated state dental associations and have also included the A.D.A. Annual Session, Greater New York Meeting, and the Chicago Mid-Winter Meeting. Besides his lecture series, he has conducted numerous hands-on workshops, webinars and published a variety of articles on esthetic restorative dentistry for journals and magazines. Dr. Braun continues to be selected by *Dentistry Today* as one of the top clinicians in dental continuing education.

**To learn more about the 3M Post and Core Solution, visit 3M.com/Relyx3D**

*Dr. Braun has received an honorarium from 3M Oral Care.*